What is claimed is:

1. A microfluidic device for processing a particle-containing fluid, comprising:

an enrichment zone to prepare an enriched particle sample from the particle-containing fluid; and

a gas actuator to provide a gas pressure sufficient to move the enriched particle sample from the enrichment zone.

2. The microfluidic device of claim 1, wherein the device comprises a flow through member in fluid communication with the enrichment zone, the flow through member configured to substantially prevent passage of particles of the particle-containing fluid while allowing fluid of the particle-containing fluid to exit the enrichment zone.

3. The microfluidic device of claim 2, wherein the flow through member sieves particles from the particle-containing fluid.

4. The microfluidic device of claim 1, wherein the device comprises a downstream region configured to receive the enriched particle sample upon actuation of the gas actuator.

5. The microfluidic device of claim 4 further comprising a first valve for coupling the enrichment zone to the downstream region.

6. The microfluidic device of claim 5 further comprising a second valve for coupling the enrichment zone to the gas actuator.

7. The microfluidic device of claim 6, wherein the device moves the enriched particle sample from the enrichment zone to the downstream region by opening the first and second valves and actuating the gas actuator to thereby increase a gas pressure within the enrichment channel relative to a gas pressure within the downstream region.

8. The microfluidic device of claim 7, wherein the device comprises a substrate and the enrichment zone, downstream region, first valve, second valve, and gas actuator are integral with the substrate.

9. The microfluidic device of claim 4, wherein the gas actuator decreases a gas pressure within the downstream region relative to a gas pressure of the enrichment zone.

10. The microfluidic device of claim 9, wherein the device comprises a substrate and the enrichment zone and gas actuator are integral with the substrate.

11. The microfluidic device of claim 4, wherein the downstream region comprises a mixing zone configured to mix a predetermined portion of the enriched particle sample with a predetermined amount of reagent.

12. The microfluidic device of claim 11, wherein the predetermined portion of the enriched particle sample comprises less than about 50% of the enriched particle sample received by the downstream region.

13. The microfluidic device of claim 1, wherein the enriched particle sample comprises cells.

14. The microfluidic device of claim 13, wherein the microfluidic device comprises a lysing zone comprising a source of electrical energy to lyse the cells.

15. The microfluidic device of claim 14 wherein said lysing zone includes a position element to position the enriched particle sample in a lysing position with respect to the lysing zone.

16. The microfluidic device of claim 1, wherein the device comprises a DNA manipulation zone configured to subject the enriched particle sample and reagent to polymerase chain reaction to provide amplified polynucleotides.

17. The microfluidic device of claim 15, wherein the device comprises a substrate and the enrichment zone and polymerase chain reaction zone are integral with the substrate.

18. The microfluidic device of claim 1, further comprising a particle-containing fluid source channel in fluid communication with the enrichment channel.

19. A microfluidic device for processing a particle containing fluid, comprising:

an enrichment zone configured to substantially separate an enriched particle sample from the particle-containing fluid;

an actuator to remove the enriched particle sample from the enrichment zone with essentially no dilution of the enriched particle sample.

20. The microfluidic device of claim 18, wherein the device comprises a partition member in fluid communication with the enrichment channel, the partition member configured to substantially prevent passage of particles of the particle-containing fluid while allowing fluid of the particle-containing fluid to exit the enrichment zone.

21. The microfluidic device of claim 19, wherein the partition member sieves particles from the particle-containing fluid.

22. The microfluidic device of claim 18, wherein the device comprises a downstream region configured to receive the enriched particle sample upon actuation of the actuator.

23. The microfluidic device of claim 21 further comprising a valve for coupling the enrichment zone to the downstream region.

24. The microfluidic device of claim 22, wherein the device moves the enriched particle sample from the enrichment zone to the downstream region by opening the valve and actuating the actuator.

25. The microfluidic device of claim 23, wherein the device comprises a substrate and the enrichment channel, downstream region, valve and actuator are integral with the substrate.

26. The microfluidic device of claim 23, wherein the actuator is configured to drive a mass of liquid against an upstream portion of the enriched particle sample.

27. The microfluidic device of claim 25, wherein a viscosity of the liquid is higher than a viscosity of the fluid of the particle-containing fluid.

28. The microfluidic device of claim 25, wherein a volume of the enriched particle sample is increased by no more than about 30% upon moving the enriched particle sample to the downstream region.

29. The microfluidic device of claim 18, wherein the enriched particle sample comprises cells.

30. The microfluidic device of claim 14 wherein said lysing zone includes a position element to position the enriched particle sample in a lysing position with respect to the lysing zone.

31. The microfluidic device of claim 28, wherein the microfluidic device comprises a lysing zone comprising a source of electrical energy to lyse the cells.

32. The microfluidic device of claim 18, wherein the device comprises a polymerase chain reaction zone configured to subject the enriched particle sample and reagent to polymerase chain reaction to provide amplified polynucleotides.

33. The microfluidic device of claim 30, wherein the device comprises a substrate and the enrichment zone and polymerase chain reaction zone are integral with the substrate.

34. A microfluidic substrate for processing fluids comprising:

an enrichment zone for preparing an enriched particle sample from a cell-containing fluid,

a lysing module, coupled to the enrichment zone for receiving the enriched particle sample and releasing intracellular material from cells within the sample to thereby forming a lysed sample

a microdroplet formation module for forming a first microdroplet of fluid from the lysed sample,

a mixing module for mixing said first microdroplet with a second microdroplet comprising a reagent to form a third microdroplet, and

an amplification module for amplifying intercellular material within said third microdroplet.

35. A microfluidic system for processing fluids comprising:

a microfluidic substrate comprising

an enrichment zone for preparing an enriched particle sample from a cell-containing fluid,

a gas actuator for providing a gas pressure,

a first valve for coupling the enrichment zone to the gas actuator,

a lysing module for lysing cells to release intracellular material, and

a second valve for coupling the enrichment zone to the lysing module, and

a control device for controlling the operation of the microfluidic substrate, wherein the control device controls fluid flow by

i) closing said first valve to thereby block flow of fluid between the enrichment zone and the gas actuator, and

ii) closing said second valve to thereby block fluid flow between the enrichment zone and the lysing module ,

and wherein the control device controls movement of the enriched particle sample by opening said first and second valves to allow said gas actuator to provide a gas

pressure for moving the enriched particle sample from the enrichment zone to said lysing module.